

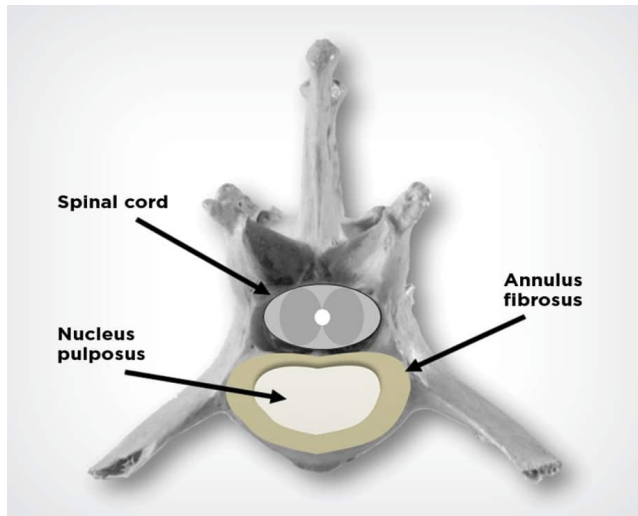


Canine Intervertebral Disc Disease: What is it and how much do we know?

- Recovery of ambulation in medically-managed non-ambulatory small-breed dogs with thoracolumbar intervertebral disc herniation

What is a disc?

- The spine is made up of individual bones called vertebra and between each of these is an intervertebral disc designed to be a shock absorber
- This has two parts
 - An outer tough, fibrous part that gives it strength
 - An inner gel like part that gives it the shock absorbing capacity



What happens when it goes wrong?

- As dogs get older the disc starts to degenerate
- This means that the inner gel like component starts to harden and become calcified
- This means it is not as good a shock absorber and more prone to problems

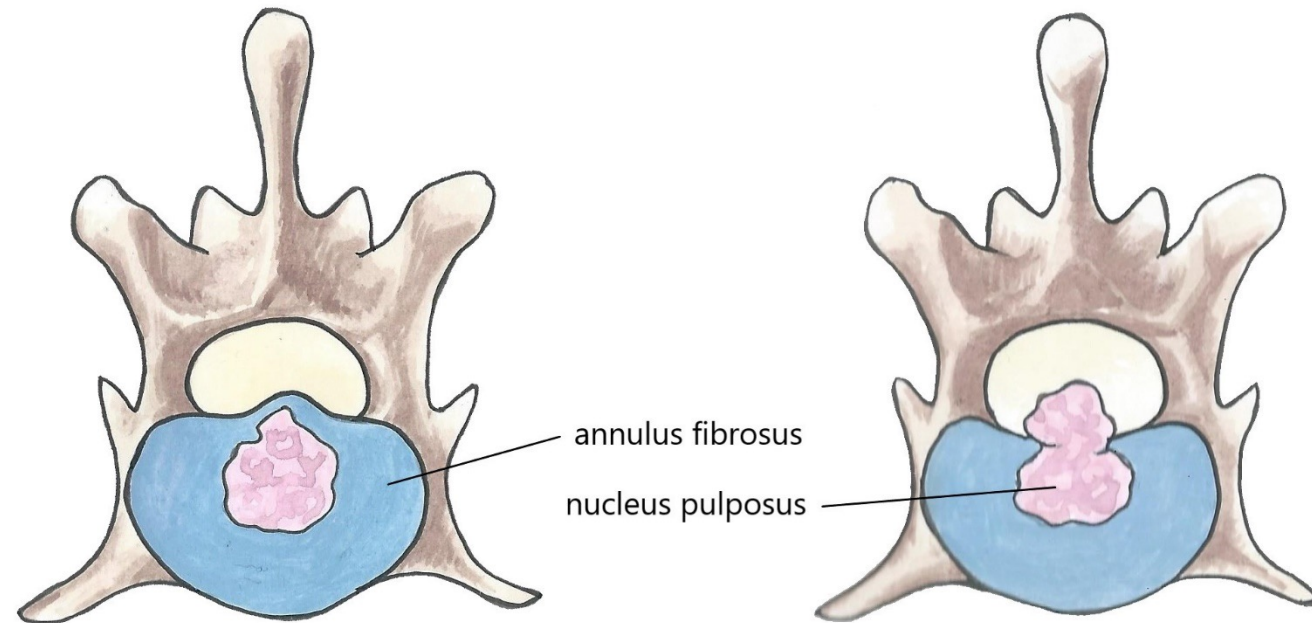


Terminology

- **Intervertebral Disc Disease (IVDD)** refers to the overall process of disc degeneration and problems associated with the degeneration
- **Intervertebral Disc Herniation (IVDH)** is a term that includes all conditions where part of the intervertebral disc enters the spinal canal or impinges on the spinal cord – there are many different types of intervertebral disc herniation
- **Intervertebral Disc Extrusion** is when the inner nucleus pulposus is squeezed out, colliding with and pressing upon the spinal cord (like a jam doughnut or toothpaste tube)
- **Conservative/ medical management** are interchangeable terms for any treatment regime that does not involve surgery – this almost always consists of pain relief, cage rest and physiotherapy
- **Fenestration** is a surgical technique where we make a window into the disc and scoop out the jam

protrusion

extrusion



Intervertebral Disc Extrusion

- This is where the now hardened and abnormal inner component of the disc ‘explodes’ out and collides with the spinal cord
- This causes two types of trauma to the spinal cord
 - Contusion (bruising)
 - Compression
- Each individual disc extrusion is a unique combination of these



Who gets them and what does it look like?

Who?

- The most affected are chondrodystrophic dogs such as dachshunds, cocker spaniels, corgis and basset hounds
- The median age is 5yrs but can occur from 1yr of age
- In the miniature dachshund thoracolumbar intervertebral disc herniation is known to have a lifetime prevalence of ~20% and is fatal in 25% of cases (Bergknut et al 2012) – **so 5% of all miniature dachshunds will die of IVDH!**

What does it look like?

- Signs usually start very suddenly and initially progress and range from back pain alone to complete paralysis and loss of feeling



What next?



Management

- It seems logical that when there is a compressive problem we should remove the compression.....
- In fact surgical decompression was first introduced over 50 years ago and it has been very successful
- There is a general perception that more severely affected patients require surgery
- Given the success of surgical management it is very difficult for vets to recommend non-surgical management
- However, we know that many severely affected dogs will improve with non-surgical management and there have been no formal clinical trials comparing surgical and non-surgical management
- There are currently no robust criteria to distinguish patients that unequivocally require surgery from those which will recover whilst receiving non-surgical medical management

What are we doing at Cambridge

- We are looking for dogs who have become suddenly unable to walk on their back legs, are suspected to have intervertebral disc extrusions and who cannot afford surgery
- They will have a consultation, neurological examination and MRI (under sedation) to confirm the diagnosis of a disc extrusion
- We will then assist with 12 weeks medical management (rest, pain relief, etc.)
- After 12 weeks they will return and have another consultation, neurological examination and MRI
- We aim to:
 - Determine what proportion of dogs will get better without surgery**
 - Determine if there anything that can help us predict which dogs need surgery and which do not**



How is it going so far?

- So far, we have included 19 dogs with 6/19 being Grade 5 (paralysed and deep pain negative)
- Out of 13 dogs who retained deep pain perception 12 recovered the ability to walk within 12 weeks
- Of the 6 dogs who deep pain negative 4 have recovered the ability to walk within 12 weeks
- The average time taken to recover the ability to walk is 17.5 days

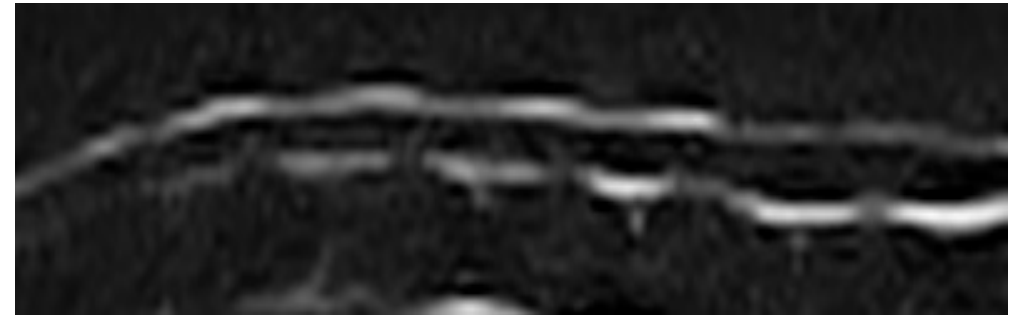


What have we learned so far?

1. When surgery is not an option conservative management seems a very reasonable option however, we need more cases to prove this
2. We can highlight the spinal cord swelling on MRI and measure it
3. And in most cases, it is quite well correlated with the clinical signs



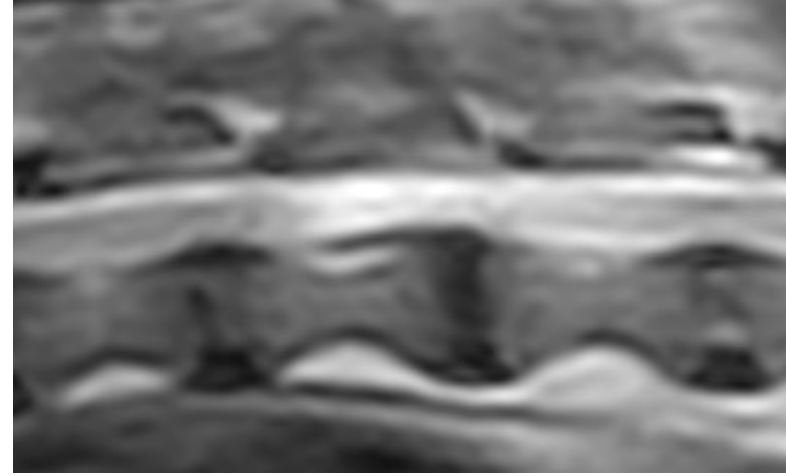
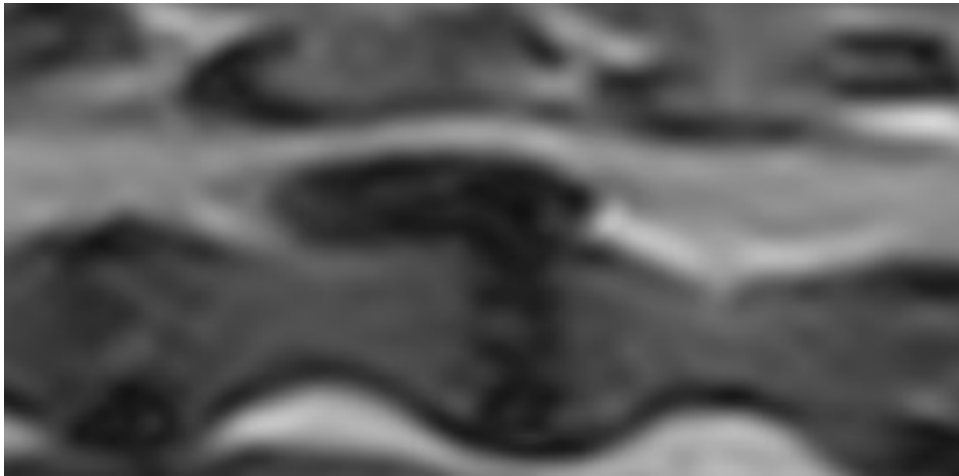
An MRI showing spinal cord swelling



An MRI showing no spinal cord swelling

What have we learned so far?

4. The nature of the disc material (jam) causing the compression changes over time
5. And significant amounts are sometimes (but not always) removed by the body
6. But this does not seem to be necessary for recovery in every case



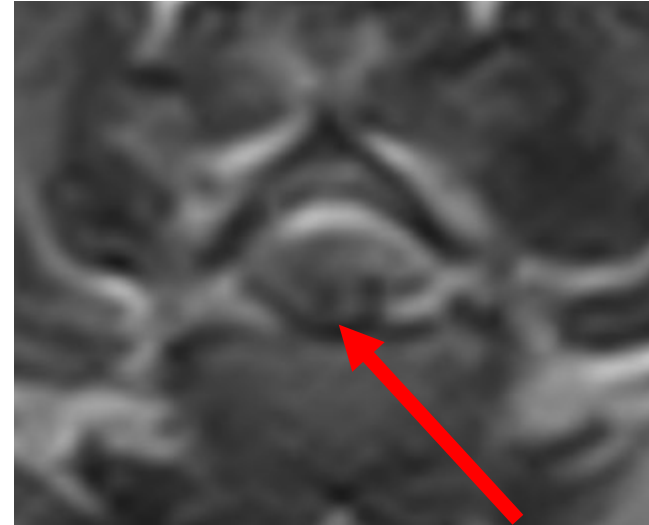
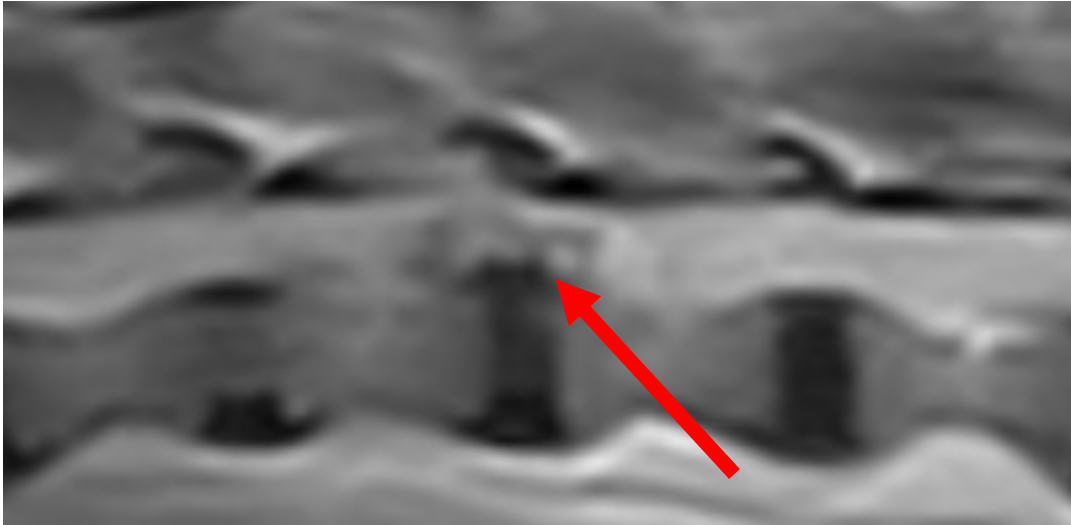
A few cases

- 4y 10m FN Mini Dachshund
- Had a previous surgery for an intervertebral disc extrusion 4 months before coming to the QVSH and had fully recovered
- She started to have back pain and despite pain relief and rest over 24-48 hours she became paralysed with no pain sensation

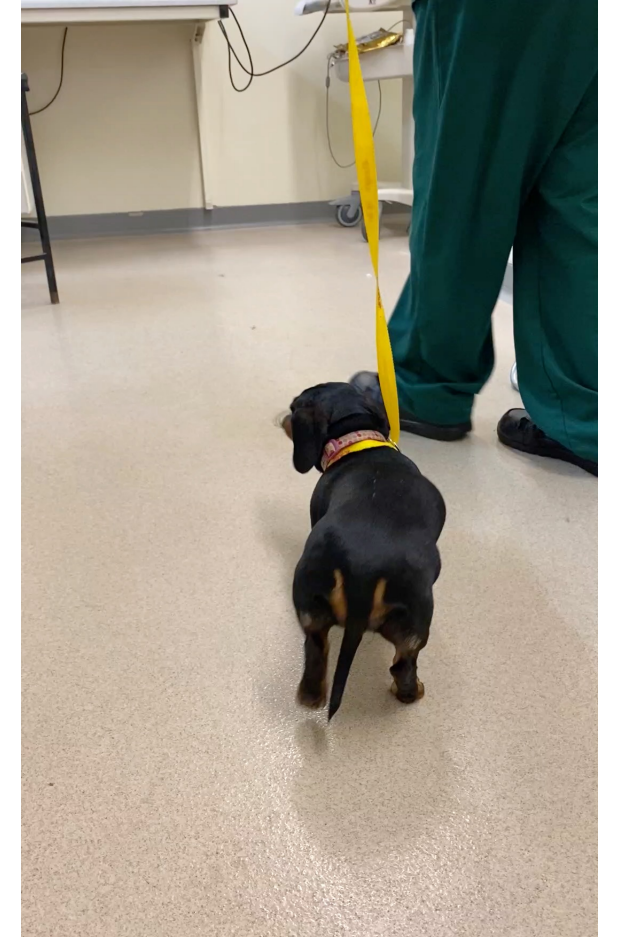
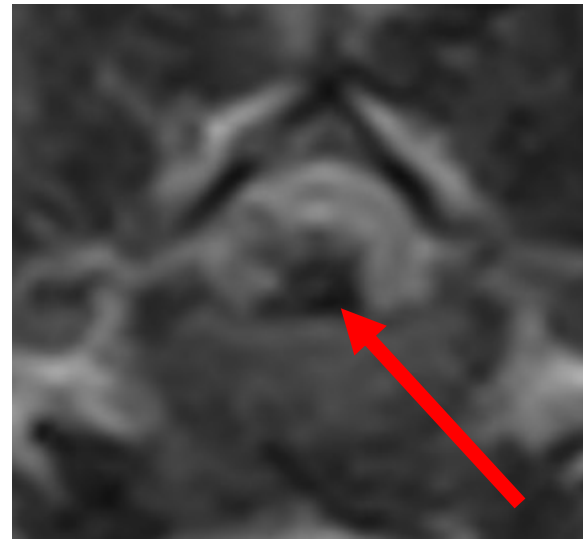
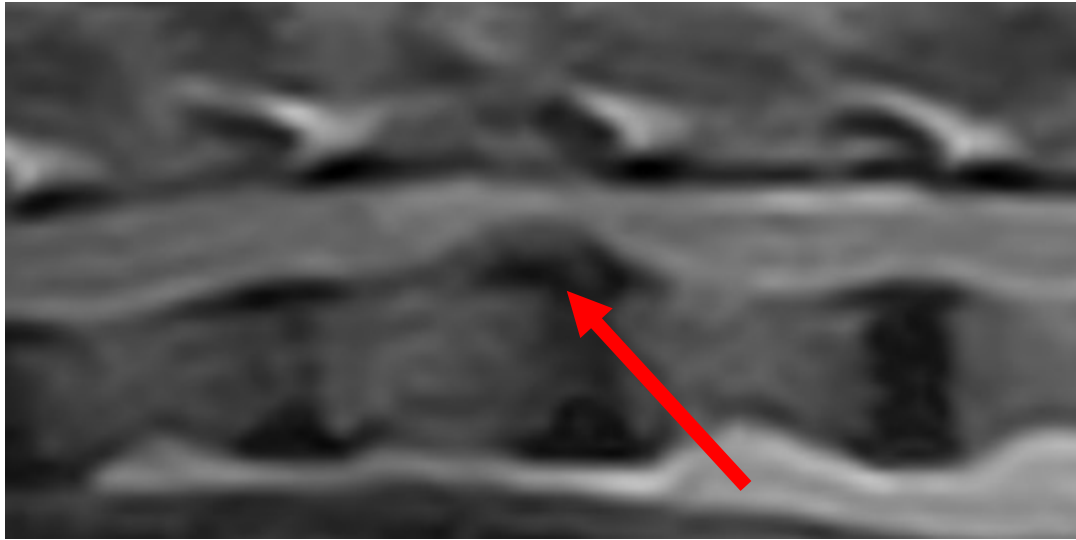


A few cases

- Her MRI showed a T13-L1 disc extrusion



After 12 weeks



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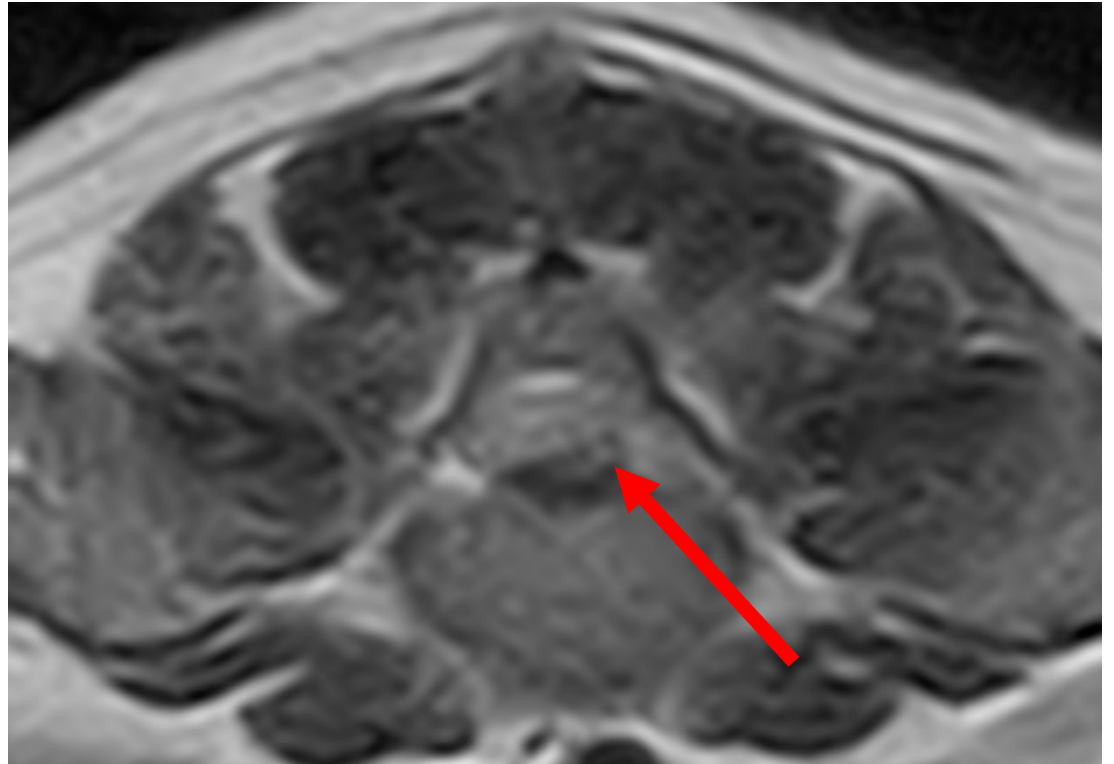
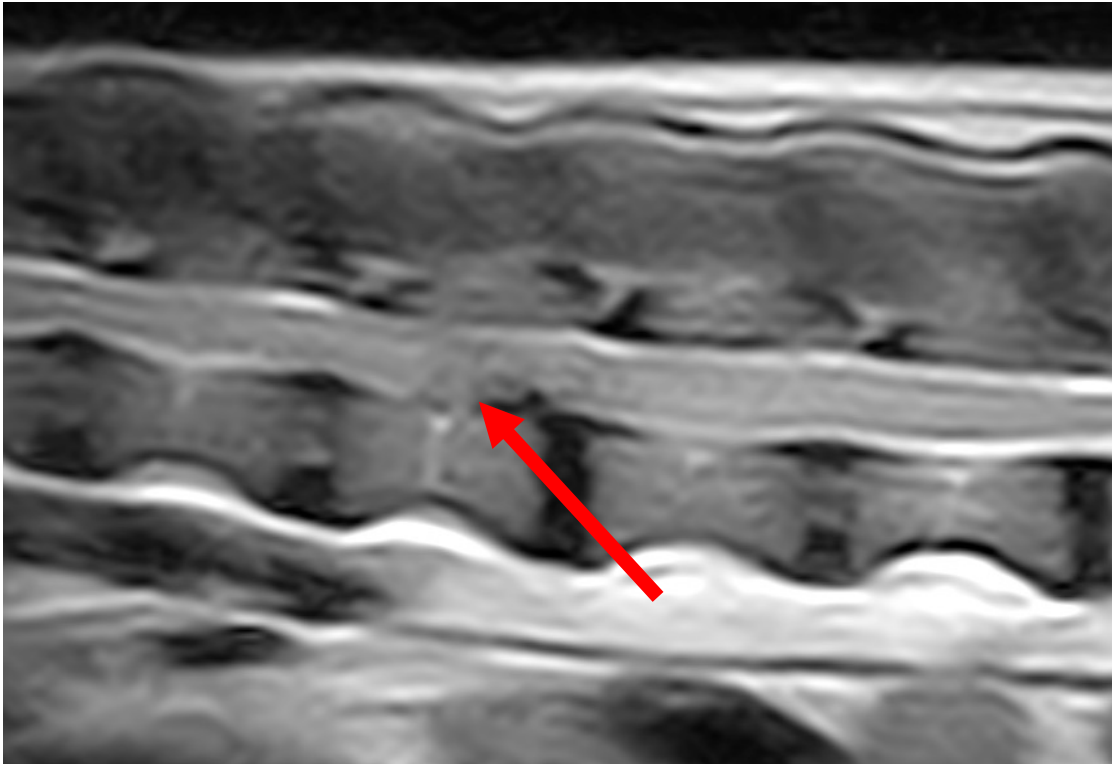
A few cases

- 5y 4m MN Mini Dachshund
- Despite pain relief and rest he progressed from being off colour to being paralysed over 2-3 days
- When he came to the QVSH he was a severe Grade 3

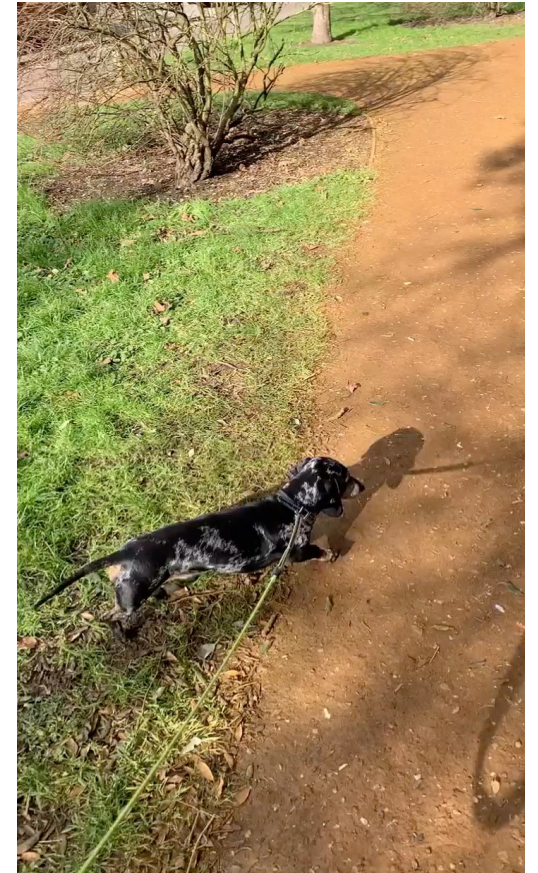
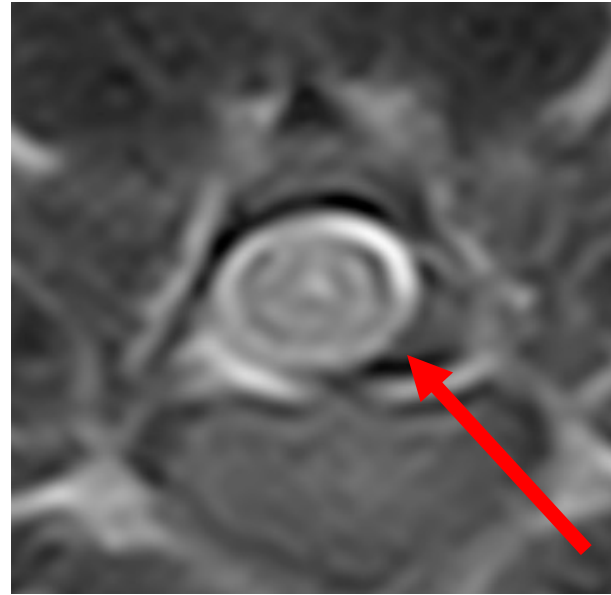
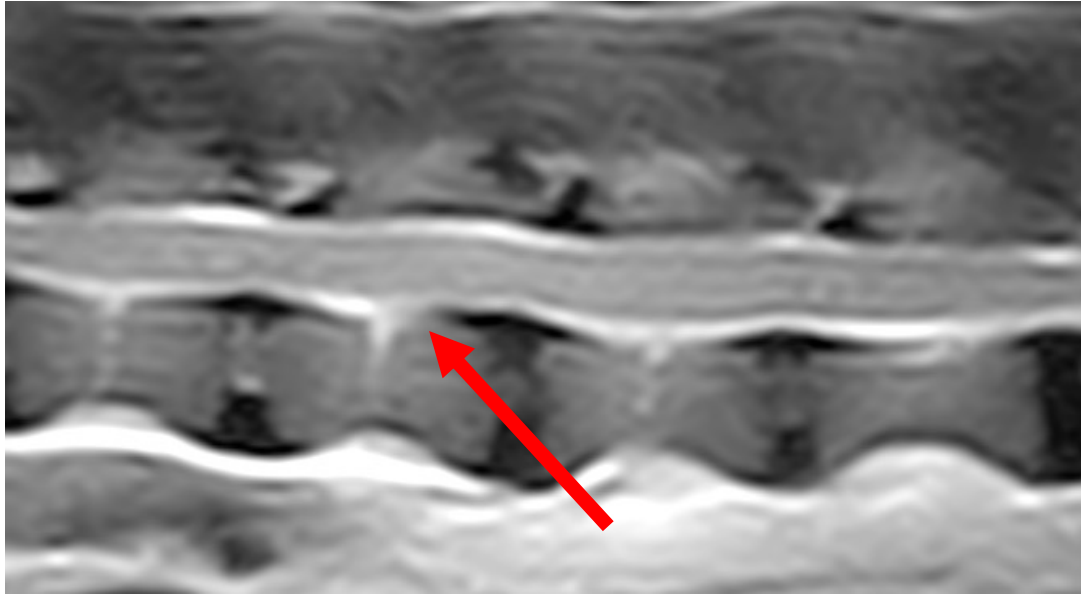


A few cases

- His MRI showed a L3-4 disc extrusion



After 12 weeks



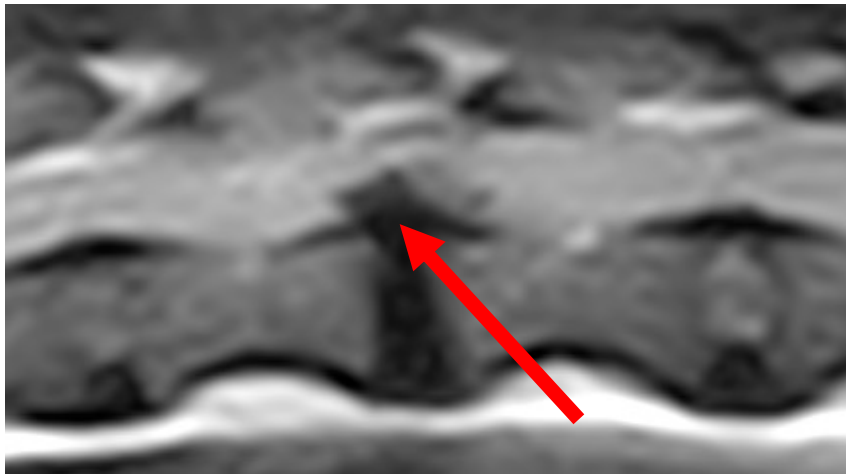
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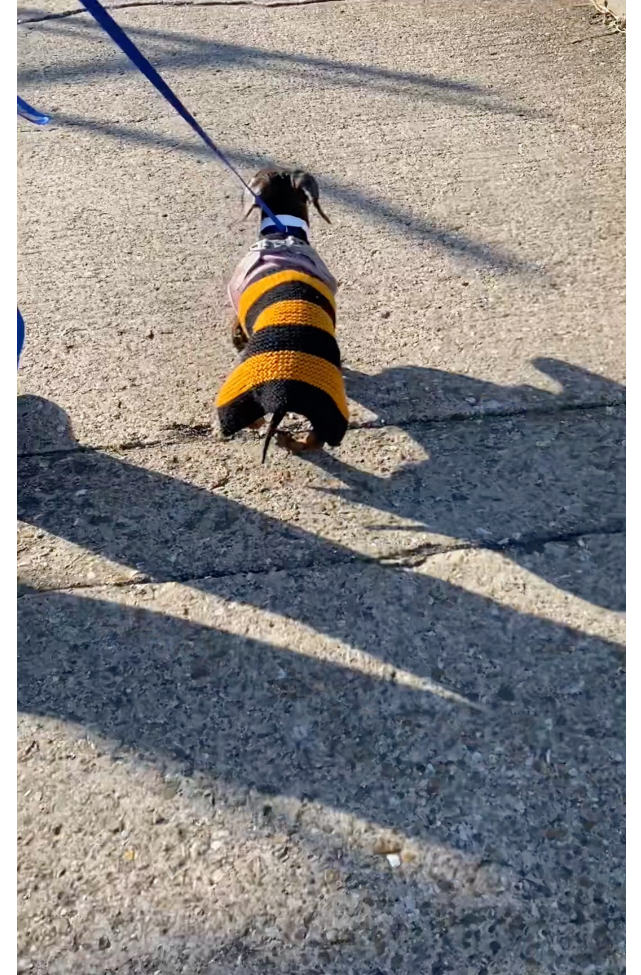
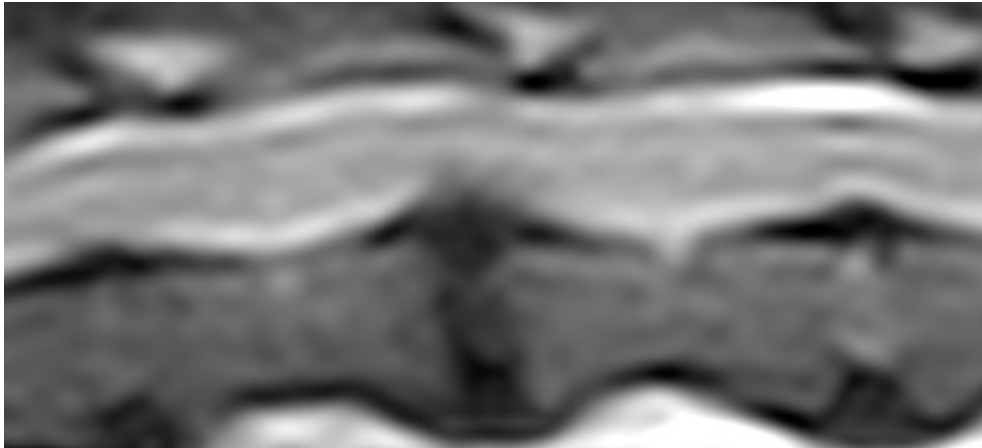
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A few cases

- 6y FN Mini Dachshund
- Progressed from back pain to paralysis without deep pain sensation in 12 hours
- Her MRI showed a T13-L1 disc extrusion



A few cases



What else are we doing?



Further research

1. A new definition of success
2. Mineralised disc analysis
3. Tekscan gait analysis



A new definition of success

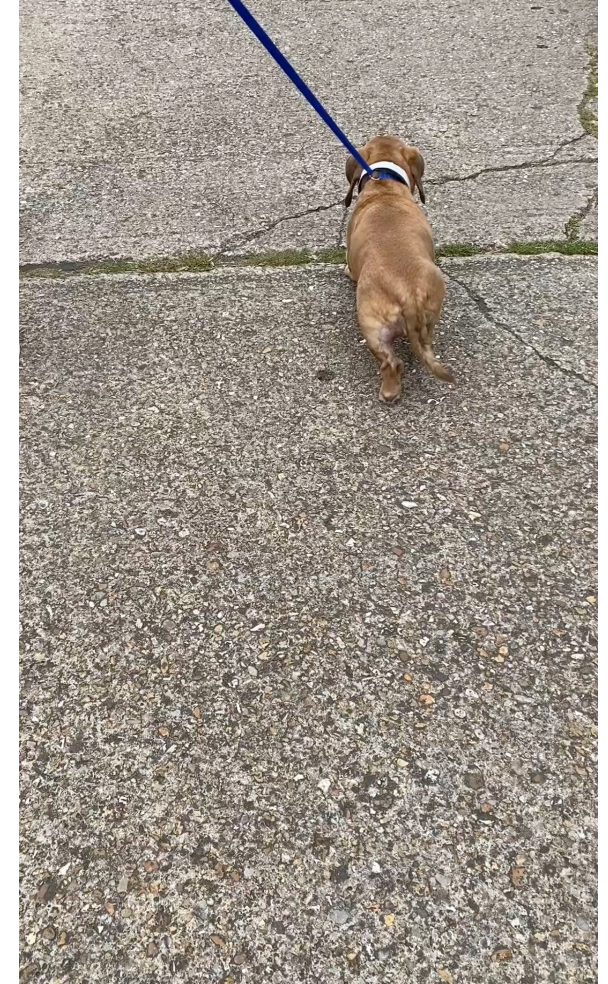
- Currently success is defined as the ability to do 10 steps unaided
- This gives a binary result of either yes or no
- Instead, we are working on a new definition that reflects the more continuous scale of improvement

50 STEP CYCLES UNAIDED



A new definition of success

- This will allow an objective continuous measure of success that can also be used to document improvement without the need for specialist equipment
- It will also allow objective comparison between outcomes for dogs treated surgically and medically

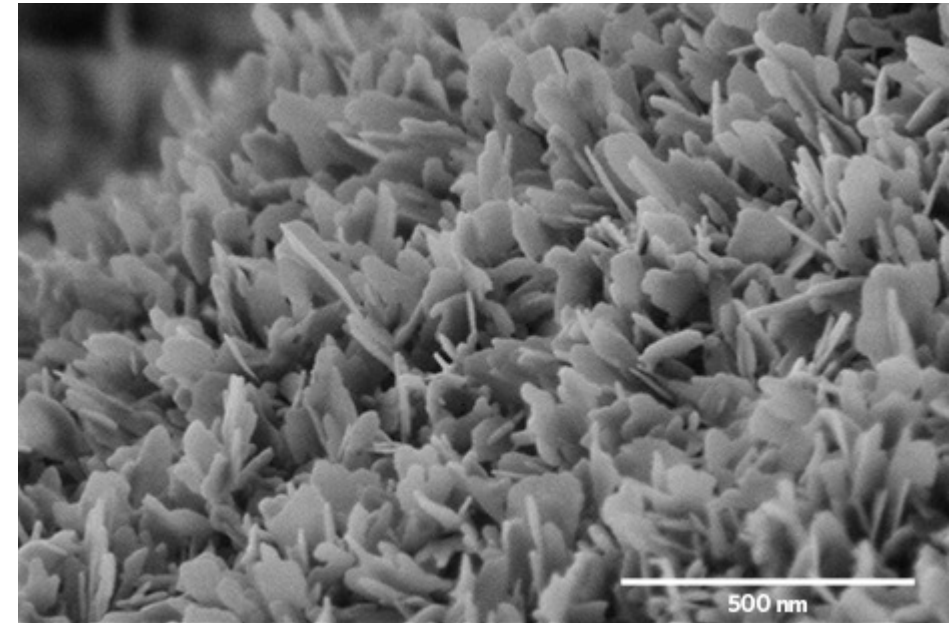


Mineral content analysis

- Earlier I mentioned about disc degeneration and calcification
- We are using FTIR, XRD and electron spectroscopy to analyse disc material removed during surgery
- Our aim is to find out if the crystalline structure is related to extrusion, or to the degree of spinal cord damage?

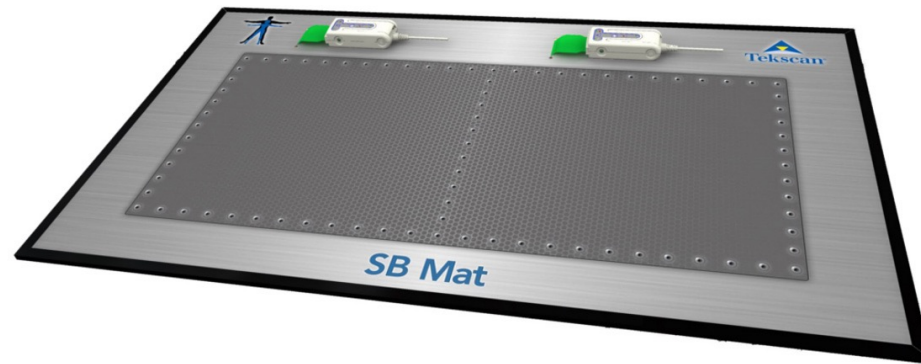
Crystal deposits in the human intervertebral disc:
implications for disc degeneration

Helen E. Gruber et al The Spine Journal 7 (2007) 444–450



Tekscan gait analysis

- The Tekscan is a pressure matt which records pressures as dogs walk over it
- We are going to use the gait analysis equipment to try to learn why some dogs learn to 'spinal walk' and some do not
- To develop objective measures of recovery in dogs who have undergone both surgical and medical management



Intervertebral disc scoring scheme

- Several countries in Scandinavia have had an X-ray schemes for years
- This involves taking X-rays of the entire spine in dogs between 2-4 years and counting the number of calcified discs
- Correlation between numbers of disc calcifications and risk of future extrusions
- Breeding recommendations made based on grade assigned following the X-rays
- Highest grade if >5 calcified discs

Rosenblatt AJ, Bottema CD, Hill PB. Radiographic scoring for intervertebral disc calcification in the Dachshund. Vet J. 2014 Jun;200(3):355-61. doi: 10.1016/j.tvjl.2014.03.023. Epub 2014 Mar 27. PMID: 24742872.

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THANK YOU TO EVERYONE WHO HAS PARTICIPATED IN THE STUDY



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THANK YOU FOR LISTENING

**Please follow Cambridge IVDD Research Group on Facebook
(@CambridgeIVDD) for more information on intervertebral disc disease and
details of research we are doing at Cambridge**



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References

- Argent, V., Fraser, A., Alves, L., et al. Spontaneous regression of a cervical intervertebral disc extrusion in French bulldogs documented on MRI after medical management. *Veterinary Record Case Reports* 2019; 7: e000817. doi: 10.1136/vetreccr-2019-000817
- Bergknut N, Egenvall A, Hagman R et al. Incidence of intervertebral disk degeneration-related diseases and associated mortality rates in dogs. *JAVMA* 2012; 240 (11):1300-9
- Brisson , B. A. (2010) *Vet Clinics of North America Small . Small Animal Practice* 40 , 829 - 858
- Freeman PM, Jeffery ND Re-opening the window on fenestration as a treatment for acute thoracolumbar intervertebral disc herniation in dogs. *Journal of Small Animal Practice* 2017; 58: 199-204.
- Hansen , H. J. (1951) A pathologic-anatomical interpretation of disc degeneration in dogs . *Acta Orthopaedica Scandinavica* 20 , 280 - 293
- Hansen , H. J. (1952) A pathologic-anatomical study on disc degeneration in dog, with special reference to the so-called enchondrosis intervertebralis . *Acta Orthopaedica Scandinavica* 11 , 1 - 117
- Jeffery ND, Barker AK, Hu HZ, et al. Factors associated with recovery from paraplegia in dogs with loss of pain perception in the pelvic limbs following intervertebral disk herniation. *J Am Vet Med Assoc.* 2016;248(4):386-394. doi:10.2460/javma.248.4.386



References

- Moore SA, Early PJ, Hettlich BF. Practice patterns in the management of acute intervertebral disc herniation in dogs. J Small Anim Pract. 2016; 57(8):409-15.
- Prata , R. G. (1981) Neurosurgical treatment of thoracolumbar discs: the rationale and value of laminectomy with concomitant disk removal. Journal of the American Animal Hospital Association 17 , 17 - 26
- Levine , J. M. , Levine , G. J. , Johnson , S. I. , et al. (2007) Evaluation of the success of medical management for presumptive thoracolumbar intervertebral disk herniation in dogs . Veterinary Surgery 36 , 482 – 491
- Steffen , F. , Kircher , P. R. & Dennler , M. (2014) Spontaneous regression of lumbar Hansen type 1 disk extrusion detected with magnetic resonance imaging in a dog . Journal of the American Veterinary Medical Association 244 , 715 – 718
- Dimar, J. R. , Glassman , S. D. , Raque , G. H. , et al. (1999) The influence of spinal canal narrowing and timing of decompression on neurological recovery after spinal cord contusion in a rat model . Spine 24 , 1623 - 1633
- McKee , W. M. (1992) A comparison of hemilaminectomy (with concomitant disk fenestration) and dorsal laminectomy for the treatment of thoracolumbar disk protrusion in dogs . Veterinary Record 130 , 296 – 300
- Sukhiani , H. R. , Parent , J. M. , Atilola , M. A. , et al. (1996) Intervertebral disk disease in dogs with signs of back pain alone: 25 cases (1986-1993) . Journal of the American Veterinary Medical Association 209 , 1275 - 1279



Questions

If management is the case, why are so many hospitals operating on dachshunds every day?

There are a few different reasons why. Firstly, there has been more research into surgery, so the reported prognosis is more reliable. Secondly, we know some dogs do require surgery to recover but have no way of predicting who they are. Lastly, there is a suggestion that dogs will recover more completely and/ or more rapidly with surgery. This is why we would like to develop some evidence-based criteria to help direct surgery to those who require it most. Also by using our new measure of success it will allow us to compare outcomes much more easily to find out if it is true that dogs improve more quickly or completely with surgery.

Have you found any difference in the development of progressive myelomalacia in conservative treatment vs surgery?

Progressive ascending-descending myelomalacia is too rare for us to really have an idea of this and is beyond the scope of our current study. If the current trend in our study continues and we will probably manage more dogs conservatively in the future which will give us a great opportunity to find out.

In the conservative treatment studied were any treatments other than rest and pain relief used, e.g. hydrotherapy?

No, they receive pain relief, rest, physiotherapy and if required bladder management. By doing it this way it will make it much easier to see the effect of other interventions such as hydrotherapy.

